SECTION A.
TECHNICAL NOTES

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These technical notes include information on sampling and weighting, survey methodology, sampling and nonsampling errors, and discussions of data comparisons to previous cycles of the National Survey of Recent College Graduates (NSRCG) and the Integrated Postsecondary Education Data System (IPEDS) data. For a more detailed discussion of survey methodology, readers are referred to the 1999 NSRCG Methodology Report.

OVERVIEW

The National Survey of Recent College Graduates (NSRCG) is sponsored by the National Science Foundation (NSF), Division of Science Resources Statistics (SRS). The NSRCG is one of three data collections covering personnel and graduates in science and engineering. The other two surveys are the National Survey of College Graduates (NSCG) and the Survey of Doctorate Recipients (SDR). Together, they constitute NSF's Scientists and Engineers Statistical Data System (SESTAT). These surveys serve as the basis for developing estimates and characteristics of the total population of scientists and engineers in the United States.

The first NSF-sponsored NSRCG (then known as New Entrants) was conducted in 1974. Subsequent surveys were conducted in 1976, 1978, 1979, 1980, 1982, 1984, 1986, 1988, 1990, 1993, 1995, 1997, and 1999. The initial survey collected data on only bachelor's degree recipients, but all subsequent surveys included both bachelor's and master's degree recipients.

For the 1999 NSRCG, a sample of 279 colleges and universities was asked to provide lists of eligible bachelor's and master's degree recipients. From these lists, a sample of 13,918 graduates (9,786 bachelor's and 4,132 master's recipients) was selected. These graduates were interviewed between May 1999 and March 2000. Computer-assisted telephone interviewing (CATI) served as the primary means of data collection. Mail data collection was used only for those who could not be reached by telephone. The weighted response rates were 99.5 percent for institutions and 78 percent for graduates.

The NSRCG questionnaire underwent relatively few revisions for the 1999 survey. These revisions consisted mainly of deleting a series of questions about alternative arrangements with employers that had been added for the 1997 cycle only. All revisions were done in coordination with similar revisions to the other SESTAT surveys. Topics covered in the survey include:

- Educational experience before and after obtaining the sampled degree;
- Graduate employment characteristics including occupation, salary, unemployment, underemployment, and postdegree work-related training;
- Relationship between education and employment; and
- Graduate background and demographic characteristics.

SAMPLE DESIGN

The NSRCG used a two-stage sample design. In the first stage, a stratified nationally representative sample of 279 institutions was selected with probability proportional to size. There were 106 self-representing institutions, also known as certainty units. For each institution, the measure of size was a composite related to both the number of graduates and the proportion of these who were black or Hispanic. The 173 noncertainty institutions were implicitly stratified by sorting the list by type of control (public, private), region, and the percentage of degrees awarded in science or engineering. Institutions were then selected by systematic sampling from the ordered list.

The second stage of the sampling process involved selecting graduates within the sampled institutions by cohort. Each sampled institution was asked to provide lists of graduates for sampling. Within graduation year (cohort), each eligible graduate was then classified into one of 40 strata based on the graduate's major field of study and degree level. While race was not an explicit stratification variable, black, Hispanic, and American Indian/Alaskan Native graduates were assigned a measure of size equal to three, while all other graduates were assigned a measure of size equal to one. This method had the same effect as oversampling black, Hispanic, and American Indian/Alaskan Native graduates by a factor of three. Table 1 lists the major fields and the corresponding sampling rates by cohort and degree.

These rates are overall sampling rates for the major field, and include the institution's probability of selection and the within-institution sampling rate. To achieve the within-institution sampling rate, the overall rate was divided by the institution's probability of selection. The sampling rates by stratum were applied within each eligible responding institution and resulted in sampling 13,918 graduates, slightly larger than the target sample size of 13,500 because persons with unknown majors were also included for complete population coverage.

Graduate Eligibility

To be included in the sample, the graduates had to meet all of the following criteria:

- They received a bachelor's or master's degree in an eligible major from the college or university from which they were sampled;
- They received their degree within the two academic years in the study. For the 1999 study, there were two academic years (July 1996 through June 1997, and July 1997 through June 1998);
- They were under the age of 76 and were not institutionalized during the week of April 15, 1999 (the reference week); and
- They lived in the United States during the reference week.

Data Collection and Response

Prior to data collection from graduates, it was first necessary to obtain the cooperation of the sampled institutions that provided lists of graduates. All eligible sampled institutions except one provided graduate lists for the 1999 NSRCG. In addition, one sampled institution was ineligible because no S&E degrees were awarded during the two cohort years for the 1999 survey. The response rates for the institutional list collection were 99.6 percent unweighted and 99.5 percent weighted.

Graduate data collection took place between May 1999 and March 2000, with computer-assisted telephone interviewing as the primary means of data collection. Flyers were sent to all graduates announcing the study and asking for the phone numbers at which they could

Table 1. **Major fields and corresponding sampling rates, by cohort and degree: April 1999**

Major field	1997 bachelor's rate	1997 master's rate	1998 bachelor's rate	1998 master's rate
Computer sciences	0.0082	0.0206	0.0074	0.0189
Biological sciences	0.0069	0.0142	0.0066	0.0145
Environmental, agricultural & forestry sciences	0.0116	0.0170	0.0107	0.0178
Mathematics/statistics	0.0132	0.0224	0.0132	0.0241
Chemistry	0.0155	0.0238	0.0152	0.0257
Physics/astronomy	0.0448	0.0311	0.0438	0.0328
Other physical sciences, earth sciences, geology oceanography	0.0353	0.0368	0.0353	0.0357
Psychology	0.0058	0.0085	0.0058	0.0095
Economics	0.0097	0.0167	0.0092	0.0172
Political science	0.0094	0.0153	0.0096	0.0153
Sociology/anthropology	0.0052	0.0178	0.0050	0.0174
Other social sciences	0.0082	0.0136	0.0082	0.0139
Aero/astronautical engineering	0.1253	0.0798	0.1329	0.0791
Chemical engineering	0.0240	0.0467	0.0243	0.0458
Civil engineering	0.0148	0.0221	0.0153	0.0224
Electrical engineering	0.0121	0.0248	0.0120	0.0244
Industrial engineering	0.0428	0.0283	0.0443	0.0262
Mechanical engineering	0.0124	0.0256	0.0131	0.0263
Other engineering	0.0244	0.0264	0.0237	0.0265
Unknown major	0.0069	0.0151	0.0070	0.0149

SOURCE: National Science Foundation/Division of Science Resources Statistics, National Survey of Recent College Graduates, 1999.

be reached during the survey period. Extensive tracing of graduates was required to obtain the desired response rate. Tracing activities included computerized telephone number searches, national change of address searches (NCOA), school alumni office contacts, school major field department contacts, directory assistance, military locators, post office records, personal referrals from parents or others who knew the graduate, and the use of professional tracing organizations.

Table 2 gives the response rates by cohort, degree, major, type of address, gender, and race/ethnicity. The overall unweighted graduate response rate was 79 percent; the weighted response rate was 78 percent. As can be seen from table 2, response rates varied somewhat by graduate characteristics. Rates were lowest for graduates with school sampling lists that provided no address, provided a foreign address, or identified the graduate as a nonresident alien. It is possible that many unlocated persons with foreign addresses or listed as nonresident aliens were actually ineligible for the survey due to living outside the United States during the survey reference week. However, a graduate was only classified as ineligible if his/her ineligibility status could be confirmed.

Weight Calculations

To produce national estimates, the data were weighted. The weighting procedures adjusted for unequal selection probabilities, for nonresponse at the institution and graduate level, and for duplication of graduates on the sampling file (graduates in both cohorts). In addition, a ratio adjustment was made at the institution level, using the number of degrees awarded as reported in IPEDS for specified categories of major and degree level. Because this adjustment was designed to reduce the variability associated with sampling institutions, it was not affected by the differences in target populations between NSRCG and IPEDS at the person level. These differences between NSRCG and IPEDS are discussed in a later section of these notes. The final adjustment to the graduate weights adjusted for responding graduates who could have been sampled twice. For example, a person who obtained an eligible bachelor's degree in 1997 could have obtained an eligible master's degree in 1998 and could have been sampled for either degree. To make the estimates from the survey essentially unbiased, the weights of all responding graduates who could have been sampled twice were divided by 2. The weights of the graduates who were not eligible to be sampled twice were not adjusted.

The weights developed for the 1999 NSRCG comprise both full sample weights for use in computing survey estimates, and replicate weights for variance estimation using a jackknife replication variance estimation procedure.

Data Editing

Most editing checks were included within the CATI system, including range checks, skip pattern rules, and logical consistency checks. Skip patterns were controlled by the CATI system so that inappropriate items were avoided and appropriate items were not missed. For logical consistency check violations, CATI screens appeared that explained the discrepancy and asked the respondent for corrections. Some additional logical consistency checks were added during data preparation. All of the edit checks discussed above were rerun after item nonresponse imputation.

Imputation of Missing Data

Missing data occurred if the respondent cooperated with the survey but did not answer one or more individual questions. The level of item nonresponse in this study was very low (typically 1 percent or less) due to the use of CATI for data collection and of data retrieval techniques for missing key items. However, imputation for item nonresponse was performed for each survey item to make the study results simpler to present and to allow consistent totals to be obtained when analyzing different questionnaire items. "Not applicable" responses were not imputed because these represented respondents who were not eligible to answer the given item.

Imputation was performed using a hot-deck method. Hot-deck methods estimate the missing value of an item by using values of the same item from other record(s) in the same file. Using the hot-deck procedure, each missing questionnaire item was imputed separately. First, respondent records were sorted by items thought to be related to the missing item. Next, a value was imputed for each item nonresponse recipient from a respondent donor within the same subgroup. The results of the imputation procedure were reviewed to ensure that the plan had been followed correctly. In addition, all edit checks were run on the imputed file to be sure that no data inconsistencies were created in the imputation process.

Table 2. **Number of graduates, unweighted graduate response rates, and weighted graduate response rates, by graduate characteristics: April 1999**

Graduate characteristic	Total	Response		Non-response	Unweighted graduate response rate[2]	Weighted graduate response rate[2]
		Complete	Ineligible[1]		Percent	
Total	13,918	9,984	987	2,947	78.8	77.8
Graduation cohort[3]						
1996-1997	6,955	4,858	523	1,574	77.4	76.4
1997-1998	6,963	5,126	464	1,373	80.3	79.2
Sampled degree[3]						
Bachelor's.	9,786	7,111	610	2,065	78.9	77.6
Master's	4,132	2,873	377	882	78.7	78.5
Sampled degree major[3]						
Computer sciences	928	640	62	226	75.6	74.9
Biological sciences	1,340	1,038	72	230	82.8	83.5
Environmental/agricultural science	467	366	29	72	84.6	85.3
Mathematics/statistics	587	449	24	114	80.6	82.0
Chemistry	469	384	15	70	85.1	85.8
Physics/astronomy	455	352	27	76	83.3	84.1
Other physical sciences, earth science	492	408	26	58	88.2	88.3
Psychology	1,536	1,074	73	389	74.7	75.8
Economics	517	306	45	166	67.9	68.0
Political science	1,100	741	77	282	74.4	75.0
Sociology/anthropology	600	422	33	145	75.8	75.8
Other social sciences	646	441	51	154	76.2	75.9
Aero/astronautical engineering	463	370	14	79	82.9	80.9
Chemical engineering.	492	391	24	77	84.3	84.7
Civil engineering	558	436	22	100	82.1	83.1
Electrical engineering	946	696	36	214	77.4	76.8
Industrial engineering	488	349	29	110	77.5	76.9
Mechanical engineering	599	464	31	104	82.6	82.2
Other engineering	682	531	46	105	84.6	84.5
Not reported	553	126	251	176	68.2	67.8
Type of address provided by school at time of sampling[4]						
U.S. address only	12,281	9,181	692	2,408	80.4	79.4
Foreign address	565	255	134	176	68.8	67.1
No address	1,072	548	161	363	66.1	64.9
Gender of graduate[3]						
Male	7,372	5,339	487	1,546	79.0	77.5
Female	5,403	3,855	421	1,127	79.1	78.7
Not reported	1,143	790	79	274	76.0	74.7

See end of table for notes and sources.

Table 2. **Number of graduates, unweighted graduate response rates, and weighted graduate response rates, by graduate characteristics: April 1999**

Graduate characteristic	Total	Response		Non-response	Unweighted graduate response rate[2]	Weighted graduate response rate[2]
		Complete	Ineligible[1]		Percent	
Race/ethnicity[3]						
White, non-Hispanic	5,865	4,649	272	944	83.9	82.3
Hispanic	1,510	1,089	84	337	77.7	76.0
Black, non-Hispanic	1,618	1,140	83	395	75.6	73.7
Asian or Pacific islander	1,029	699	67	263	74.4	74.3
American Indian or Alaskan native	105	81	3	21	80.0	76.3
Nonresident alien	475	253	70	152	68.0	65.4

[1]The 987 ineligibles include the following: graduates living outside the United States during the week of April 15, 1999 (370); graduates who reported an ineligible major field for their sampled degree (361); those who did not receive a degree within the correct time frame (208); those who did not attend the sampled school (18); deceased (13); duplicates (8); institutionalized (4); those who did not receive a bachelor's or master's degree (4); and other ineligible (1).

[2] The graduate response rate is calculated as (R-I)/[(R-I)+(N*p)] where R=Response (complete plus ineligible), I=Ineligible, N=Nonresponse, p=Proportion of response found in scope calculated as (R-I)/R.

[3] The cohort, degree, major, gender, and race/ethnicity codes are those reported by institutions at the time of sampling and may not match data reported by the respondents on the survey.

[4] This reflects the type of address provided by the institution at the time of sampling. Additional address information may have been provided by the alumni office during data collection. Graduates for whom both U.S. and foreign addresses were provided are included in the foreign address category.

SOURCE: National Science Foundation/Division of Science Resources Statistics, National Survey of Recent College Graduates, 1999.

ACCURACY OF ESTIMATES

The survey estimates provided in these tables are subject to two sources of error: sampling and nonsampling errors. Sampling errors occur because the estimates are based on a sample of individuals in the population rather than on the entire population and hence are subject to sampling variability. If the interviews had been conducted with a different sample, the responses would not have been identical; some figures might have been higher, while others might have been lower.

The standard error is the measure of the variability of the estimates due to sampling. It indicates the variability of a sample estimate that would be obtained from all possible samples of a given design and size. Standard errors can be used as a measure of the precision expected from a particular sample. Tables 3 and 4 contain standard errors for key statistics included in the detailed tables.

If all possible samples were surveyed under similar conditions, intervals within plus or minus 1.96 standard errors of a particular statistic would include the true population parameter being estimated in about 95 percent of the samples. This is the 95 percent confidence interval. For example, suppose the total number of 1997 and 1998 bachelor's degree recipients majoring in engineering is 114,612 and the estimated standard error is 4,297. In this case, the 95 percent confidence interval for the statistic would extend from:

114,612 - (4,297 x 1.96) to 114,612 + (4,297 x 1.96)
= 106,190 to 123,034

This means that one can be confident that intervals constructed in this way contain the true population parameter for 95 percent of all possible samples.

Estimates of standard errors were computed using a technique known as jackknife replication. As with any replication method, jackknife replication involves constructing a number of subsamples (replicates) from the full sample and computing the statistics of interest for each replicate. The mean square error of the replicate

Table 3. **Unweighted number, weighted estimate, and standard errors for 1997 and 1998 science and engineering bachelor's degree recipients, by graduate characteristics: April 1999**

Characteristic	Unweighted number	Weighted number		Weighted percent	
		Estimate	Standard error[1]	Estimate	Standard error[1]
Total 1997 and 1998 science and engineering bachelor's degree recipients	7,208	743,430	15,273	100	--
Sex					
Male	4,069	366,786	7,719	49.3	1.04
Female	3,139	376,644	13,316	50.7	1.04
Race/ethnicity					
White, non-Hispanic	4,594	561,285	16,116	75.5	0.92
Black, non-Hispanic	938	51,618	3,717	6.9	0.55
Hispanic	977	54,150	2,468	7.3	0.37
Asian/Pacific Islander	630	71,613	3,528	9.6	0.44
American Indian/Alaskan Native	69	4,765	739	0.6	0.10
Type of major field					
Science	5,026	628,819	17,008	84.6	0.73
Engineering	2,182	114,612	4,297	15.4	0.73
Major field of study					
Computer and information sciences	338	46,029	2,841	6.2	0.36
Life and related sciences	1,175	164,042	5,499	22.1	0.55
Mathematical sciences	306	23,742	1,488	3.2	0.17
Physical and related sciences	884	36,545	1,794	4.9	0.20
Psychology	787	146,704	6,119	19.7	0.58
Social and related sciences	1,536	211,756	7,232	28.5	0.66
Engineering	2,182	114,612	4,297	15.4	0.73
Occupation (those employed)					
Computer and information scientists	551	52,707	2,910	7.1	0.35
Life and related scientists	203	25,297	1,815	3.4	0.25
Mathematical and related scientists	41	3,774	679	0.5	0.09
Physical scientists	349	19,197	1,264	2.6	0.16
Psychologists	51	8,325	1,379	1.1	0.18
Social and related scientists	76	10,195	1,447	1.4	0.19
Engineers	1,435	78,702	3,365	10.6	0.53
Other occupations	3,488	427,414	11,965	57.5	0.75

[1]Standard errors were calculated with the WesVar program using the JK2 option.

KEY: -- = Not applicable.

NOTES: Represents graduates from July 1996 through June 1998. Details may not add to totals due to rounding.

SOURCE: National Science Foundation/Division of Science Resources Statistics, National Survey of Recent College Graduates, 1999

Table 4**. Unweighted number, weighted estimate, and standard errors for 1997 and 1998 science and engineering master's degree recipients, by graduate characteristics: April 1999**

Characteristic	Unweighted number	Weighted number		Weighted percent	
		Estimate	Standard error[1]	Estimate	Standard error[1]
Total 1997 and 1998 science and engineering master's degree recipients	2,929	157,029	3,578	100	--
Sex					
Male	1,847	91,722	2,249	58.4	1.22
Female	1,082	65,307	2,819	41.6	1.22
Race/ethnicity					
White, non-Hispanic	1,709	104,383	2,810	66.5	0.96
Black, non-Hispanic	295	8,377	817	5.3	0.47
Hispanic	264	7,710	617	4.9	0.39
Asian/Pacific Islander	645	35,763	1,585	22.8	0.92
American Indian/Alaskan Native	16	796	244	0.5	0.16
Type of major field					
Science	1,784	110,367	3,588	70.3	1.14
Engineering	1,145	46,663	1,701	29.7	1.14
Major field of study					
Computer and information sciences	330	19,951	1,346	12.7	0.84
Life and related sciences	263	16,569	1,672	10.6	1.07
Mathematical sciences	145	7,236	548	4.6	0.34
Physical and related sciences	276	9,056	516	5.8	0.32
Psychology	348	30,015	2,645	19.1	1.47
Social and related sciences	422	27,540	1,676	17.5	0.93
Engineering	1,145	46,663	1,701	29.7	1.14
Occupation (those employed)					
Computer and information scientists	470	26,159	1,432	16.7	0.86
Life and related scientists	105	6,419	599	4.1	0.38
Mathematical and related scientists	79	4,220	491	2.7	0.30
Physical scientists	178	6,256	445	4.0	0.29
Psychologists	114	10,201	992	6.5	0.60
Social and related scientists	107	7,259	723	4.6	0.44
Engineers	717	28,853	1,331	18.4	0.92
Other occupations	832	49,787	2,423	31.7	1.18

[1]Standard errors were calculated with the WesVar program using the JK2 option.

KEY: -- = Not applicable.

NOTES: Represents graduates from July 1996 through June 1998. Details may not add to totals due to rounding.

SOURCE: National Science Foundation/Division of Science Resources Statistics, National Survey of Recent College Graduates, 1999

estimates around their corresponding full sample estimate provides an estimate of the sampling variance of the statistic of interest. To construct the replicates, 86 stratified subsamples of the full sample were created. Eighty-six jackknife replicates were then formed by deleting one subsample at a time from the full sample. WesVar, a computer program developed at Westat, was used to calculate direct estimates of standard errors for a number of statistics from the survey.

Generalized Variance Functions

Computing and printing standard errors for each estimate from the survey is a time consuming and costly effort. For this survey, a different approach was taken for estimating the standard errors of the estimates included in this report. First, the standard errors for a large number of different estimates were directly computed using the jackknife replication procedures described above. Next, models were fitted to the estimates and standard errors and the parameters of these models were estimated from the direct estimates. These models and their estimated parameters were used to approximate the standard error of an estimate from the survey. This process is called the development of generalized variance functions.

Models were fitted for the two types of estimates of primary interest: estimated totals and estimated percentages. It should be noted that the models used to estimate the generalized variance functions may not be completely appropriate for all estimates.

Sampling Errors for Totals

For estimated totals, the generalized variance function applied assumes that the relative variance of the estimate (the square of the standard error divided by the square of the estimate) is a linear function of the inverse of the estimate. Using this model, the standard error of an estimate can be computed as:

$$se(y) = \sqrt{ay^2 + by} \qquad (1)$$

where $se(y)$ is the standard error of the estimate y, and a and b are estimated parameters of the model. The parameters of the models were computed separately for 1997 bachelor's, 1997 master's, 1998 bachelor's, and 1998 master's recipients for important domains of interest. The estimates of the parameters are given in table 5.

The following steps should be followed to approximate the standard error of an estimated total:

1. obtain the estimated total from the survey,
2. determine the most appropriate domain for the estimate from table 5,
3. refer to table 5 to get the estimates of a and b for this domain, and
4. compute the generalized variance using equation (1) above.

For example, suppose that the number of 1997 bachelor's degree recipients in engineering who were currently working in an engineering-related job was 39,400 (y = 39,400). The most appropriate domain from table 5 is engineering majors with bachelor's degrees from 1997 and the parameters are a = 0.001360 and b = 73.981. Approximate the standard error using equation (1) as:

$$se(39{,}400) = \sqrt{.001360(39{,}400)^2 + 73.981(39{,}400)} = 2{,}242.$$

Sampling Errors for Percentages

The model used to approximate the standard errors for estimates of percentages was somewhat less complex. The generalized variance for estimated percentages assumed that the ratio of the variance of an estimate to the variance of the same estimate from a simple random sample of the same size was a constant. This ratio is called the design effect and is often labeled the DEFF. Since the variance for an estimated percentage, p, from a simple random sample is $p(100 - p)$ divided by the sample size, the standard error of an estimated percentage can be written as:

$$se(p) = \sqrt{\mathrm{DEFF}(p)(100 - p)/n} \qquad (2)$$

where n is the sample size or denominator of the estimated percentage. DEFFs were computed separately for 1997 bachelor's, 1997 master's, 1998 bachelor's, and 1998 master's recipients for important domains of interest. The median or average values of the DEFFs from these computations are given in table 5.

Table 5. **Estimated parameters for computing generalized variances for estimates from the 1999 NSRCG**

Domain	Bachelor's recipients			Master's recipients		
	a	b	DEFF	a	b	DEFF
1997 graduates						
All graduates	0.000362	178.959	1.9	0.000100	104.491	1.7
Sex						
Male	0.000448	140.253	1.7	-0.000221	82.248	1.5
Female	0.001020	188.494	1.7	0.001120	90.087	1.5
Major						
Science majors	0.000617	205.101	1.6	0.000741	108.037	1.7
Engineering majors	0.001360	73.981	1.7	0.000706	41.883	1.2
Occupation						
Scientists	0.000391	141.597	1.6	-0.000553	84.331	1.3
Engineers	0.001170	92.632	1.8	0.000194	51.631	1.2
Other	0.000451	199.042	1.6	0.003460	81.213	1.3
Race/ethnicity						
White, non-Hispanic	0.000613	211.962	1.6	0.000461	85.972	1.4
Black, non-Hispanic	0.008760	74.712	1.7	0.011640	32.210	1.5
Hispanic	0.001300	84.322	1.7	0.016630	27.721	1.6
Asian/Pacific Islander	0.000185	146.232	1.3	-0.000450	70.206	1.5
American Indian/Alaskan Native	*	*	1.7	0.005100	78.874	1.5
1998 graduates						
All graduates	0.000535	124.854	1.8	0.000143	79.164	1.5
Sex						
Male	0.000187	133.510	1.6	0.000065	67.217	1.4
Female	0.001340	173.468	1.7	0.001640	70.395	1.4
Major						
Science majors	0.001020	125.447	1.6	0.000872	74.059	1.4
Engineering majors	0.000570	71.556	1.5	-0.000748	50.652	1.2
Occupation						
Scientists	0.001550	117.499	1.6	0.000008	67.588	1.3
Engineers	0.001030	69.092	1.5	0.000348	44.580	1.2
Other	0.001020	141.673	1.5	0.002040	63.025	1.3
Race/ethnicity						
White, non-Hispanic	0.000611	178.402	1.6	-0.000118	80.561	1.3
Black, non-Hispanic	0.006360	72.222	1.6	0.003180	42.757	1.5
Hispanic	0.000439	102.653	1.7	-0.002300	46.015	1.7
Asian/Pacific Islander	-0.000159	166.926	1.4	-0.000384	65.071	1.2
American Indian/Alaskan Native	0.051770	53.434	1.6	0.027470	42.640	1.2

KEY: 1999 NSRCG=The 1999 National Survey of Recent College Graduates

DEFF = Design effect.

* = Estimates not reported because the specified model resulted in R-square values too small to report.

SOURCE: National Science Foundation, Division of Science Resources Statistics, National Survey of Recent College Graduates, 1999

The following steps should be followed to approximate the standard error of an estimated percentage:

1. obtain the estimated percentage and sample size from the survey,

2. determine the most appropriate domain for the estimate from table 5,

3. refer to table 5 to get the estimates of the DEFF for this domain, and

4. compute the generalized variance using equation (2) above.

For example, suppose that the percentage of 1997 bachelor's degree recipients in engineering who were currently working in an S&E job was 67 percent ($p = 67$) and the number of engineering majors from the survey (sample size, n) was 1,100. The most appropriate domain from table 5 is engineering majors with bachelor's degrees from 1997 and the DEFF for this domain is 1.7. Approximate the standard error using equation (2) as:

$$se(67\%) = \sqrt{1.7(67)(100-67)/1100} = 1.85\%$$

NONSAMPLING ERRORS

In addition to sampling errors, the survey estimates are subject to nonsampling errors that can arise because of nonobservation (nonresponse or noncoverage), reporting errors, and errors made in the collection and processing of the data. These errors can sometimes bias the data. The 1999 NSRCG included procedures specifically designed to minimize nonsampling error. In addition, some special studies conducted during the previous cycles of the NSRCG provided some measures of nonsampling errors that are useful in understanding the data from the current survey as well.

Procedures to minimize nonsampling errors were followed throughout the survey. Extensive questionnaire design work was done by Mathematica Policy Research (MPR), NSF, and Westat. This work included focus groups, expert panel reviews, and mail and CATI pretests. This design work was done in conjunction with the other two SESTAT surveys.

Comprehensive training and monitoring of interviewers and data processing staff helped to ensure the consistency and accuracy of the data file. Data collection was done almost entirely by telephone to help reduce the amount of item nonresponse and item inconsistency. Mail questionnaires were used for cases difficult to complete by telephone. Nonresponse was handled in ways designed to minimize the impact on data quality (through weighting adjustments and imputation). In data preparation, a special effort was made in the area of occupational coding. Respondent-chosen codes were verified by data preparation staff using a variety of information collected on the survey and applying coding rules developed by NSF for the SESTAT system.

While general sampling theory can be used to estimate the sampling variability of a statistic, the measurement of nonsampling error is not easy and usually requires that an experiment be conducted as part of the data collection, or that data external to the study be used. In the 1995 NSRCG, two quality analysis studies were conducted: (1) an analysis of occupational coding; and (2) a CATI reinterview. As noted above, these special studies can also inform analysts about the 1999 survey data.

The occupational coding report included an analysis of the 1995 CATI autocoding of occupation and the best coding operation. During CATI interviewing, each respondent's verbatim occupation description was autocoded by computer into a standard SESTAT code whenever possible. Autocoding included both coding directly to a final category and coding to an intermediate code-selection screen. If the description could not be autocoded, the respondent was asked to select the appropriate occupation category during the interview. For the primary occupation, 22 percent of the responses were autocoded to a final category and 19 percent were autocoded to an intermediate screen. The results of the occupation autocoding were examined, and the process was found to be successful and efficient.

For the best coding operation, an occupational worksheet for each respondent was generated and reviewed by an experienced occupational coder. This review was based on the work-related information provided by the graduate. If the respondent's self-selected occupation code was inappropriate, a new, or "best," code was assigned. A total of 17,894 responses were received to the three occupation questions in the 1995 survey cycle. Of these, 25 percent received updated codes during the best coding process, with 16 percent being recoded from the "other" category and 9 percent recoded from the "nonother" categories. This analysis indicated that the best coding activity was necessary to ensure that the most

appropriate occupation codes were included on the final data file. As a result of this 1995 NSRCG quality study, the best coding procedure was implemented in the 1997 and 1999 surveys as well.

The second quality analysis study conducted in the 1995 NSRCG involved a reinterview of a sample of 800 respondents. For this study, sampled respondents were interviewed a second time, and responses to the two interviews were compared. This analysis found that the questionnaire items in which respondents were asked to provide reasons for certain events or behaviors had relatively large index of inconsistency values. Examples include reasons for not working during the reference week and reasons for working part time. High response variability is typical for items that ask about reasons and beliefs rather than behaviors, and the results were not unusual for these types of items. Some of the other differences between the two interviews were attributed to the time lag between the original interview and reinterview.

For the 1993 NSRCG, two data quality studies were completed: (1) an analysis of interviewer variance and (2) a behavioral coding analysis of 100 recorded interviews. The interviewer variance study was designed to measure the impact of interviewer effects on the precision of the estimates. The results showed that interviewer effects for most items were minimal and thus had a very limited effect on the standard error of the estimates. Interviewer variance was highest for open-ended questions.

The behavioral coding study was done to observe the extent to which interviewers were following the structured interview and the extent to which it became necessary for them to give unstructured additional explanation or comments to respondents. As part of the study, 100 interviews were taped and then coded on a variety of behavioral dimensions. This analysis revealed that, on the whole, the interview proceeded in a very structured manner, with 85 percent of all question and answer "dyads" being "asked and answered only." Additional unstructured interaction/discussion took place most frequently for those questions in which there was some ambiguity in the topic. In most cases this interaction was judged to have facilitated obtaining the correct response.

For both survey cycles, results from the quality studies were used to identify those questionnaire items that might need additional revision for the next study cycle. Debriefing sessions concerning the survey were held with interviewers, and this information was also used in revising the survey for the next cycle.

Comparisons of Data With Previous Years' Results

A word of caution needs to be given concerning comparisons with previous NSRCG results. During the 1993 cycle, the SESTAT system underwent considerable revision in several areas, including survey eligibility, data collection procedures, questionnaire content and wording, and data coding and editing procedures. The changes made for the 1995 through 1999 cycles were less significant but might affect some data trend analysis. While the 1993 through 1999 survey data are fairly comparable, care must be taken when comparing results from the 1990s surveys to surveys from the 1980s, due to the significant changes made in 1993. For a detailed discussion of these changes, please see the 1993, 1995, 1997, and 1999 NSRCG methodology reports.

For the 1999 NSRCG, there were no significant procedural changes that would affect the comparison of results between the 1997 and 1999 survey cycles.

Comparisons With IPEDS Data

The National Center for Education Statistics (NCES) conducts a survey of the nation's postsecondary institutions, called the Integrated Postsecondary Education Data System (IPEDS). The IPEDS Completions Survey reports on the number of degrees awarded by all major fields of study, along with estimates by gender and race/ethnicity.

Although both the NSRCG and IPEDS are surveys of postsecondary education and both report on completions from those institutions, there are important differences in the target populations for the two surveys that directly affect the estimates of the number of graduates. The reason for the different target populations is that the goals of the surveys are not the same. The IPEDS estimates of degrees awarded are intended to measure the output of the educational system. The NSRCG estimates are intended to measure the supply and utilization of a portion of graduates in the years following their completion of degrees. These goals result in definitions of the target population that are not completely consistent for the two surveys. Other

differences between the estimates can be explained to a very large extent by a few important aspects of the design or reporting procedures in the two surveys. The main differences between the two studies that affect comparisons of estimates overall and by race/ethnicity are listed below.

- The IPEDS Completions data file represents a count of degrees awarded, whereas the NSRCG represents graduates (persons). If a person receives more than one degree, institutions are instructed to report each degree separately in IPEDS. In the NSRCG, each person is counted only once.

- The NSRCG includes only people who were residing in the United States during the reference week for the survey (the week of April 15 of the survey year). People who received degrees during the years covered by the survey, but resided outside the United States during the reference week, appear in IPEDS counts but not in NSRCG counts.

- The NSRCG includes only major fields of study that meet the specific SESTAT system definition of science and engineering (S&E), while IPEDS includes all fields. The SESTAT field codes were designed to map directly to the 6-digit Classification of Instructional Program (CIP) codes used in IPEDS. However, published reports from the two studies may group the specific field codes differently for reporting purposes. Therefore, when comparing the NSRCG estimates in this report to IPEDS, care must be taken to select and group the IPEDS estimates according to the NSRCG field definitions shown in the appendix. For example, the NSRCG reporting category of Computer and Information Sciences does not include computer programming or data processing technology, but these fields are included in this category in NCES's *Digest of Education Statistics*. In addition, several NSRCG reporting categories include fields classified as multi/interdisciplinary studies in IPEDS. The NSRCG reporting category of social and related sciences has the most differences in definition from IPEDS. The IPEDS category for social and related sciences also includes history whereas the NSF category excludes history.

- The IPEDS data reflect information submitted by institutions from administrative records, whereas the NSRCG represents reports of individual graduates collected in interviews. Often, estimates differ when the mode of data collection and sources of data are different.

- Whereas the IPEDS is a census of postsecondary institutions, the NSRCG is a sample survey. As a result, NSRCG estimates include the sampling error inherent in all sample surveys.

- There is an additional consideration for estimates by race/ethnicity. Prior to the 1994–95 academic year, IPEDS collected race/ethnicity data only by broad 2-digit CIP code fields, not by the specific 6-digit CIP fields needed to identify the S&E fields as defined on NSRCG. Therefore, it is not possible to obtain IPEDS race/ethnicity data that precisely match the S&E population as defined by NSRCG for the academic years prior to 1995. For example, the 2-digit CIP for social sciences and history includes history, which is not an S&E field, but does not include such S&E fields as agricultural economics and public policy analysis which are included in the NSF category for social and related sciences.

Despite these factors, the NSRCG and IPEDS estimates are consistent when appropriate adjustments for these differences are made. For example, the proportional distributions of graduates by field of study are nearly identical, and the numerical estimates are similar. Further information on the comparison of NSRCG and IPEDS estimates is available in the report, *A Comparison of Estimates in the NSRCG and IPEDS*, available in the SRS website, at http://www.nsf.gov/sbe/srs/stats.htm.

Other Explanatory Information

Definitions

The following definitions are provided to facilitate the reader's use of the data in this report.

Major field of study: Major field of study is derived from the survey major field category most closely related to the respondent's degree field. Exhibit 1 gives a listing of the detailed major field codes used in the survey. Exhibit 2 gives a listing of the summary major field codes developed by NSF and used in the tables. The appendix lists the eligible and ineligible major fields within each summary category.

Occupation: Occupation is derived from the survey job list category most closely related to the respondent's primary job. Exhibit 3 gives a listing of the detailed job codes used in the survey, and Exhibit 4 gives the summary occupation codes developed by NSF and used in the tables.

Labor force: The labor force includes individuals working full or part time as well as those not working but seeking work or on layoff. It is a sum of the employed and the unemployed.

Unemployed: The unemployed are those who were not working on April 15 and were seeking work or on layoff from a job.

Type of employer: Type of employer is the sector of employment in which the respondent was working on his or her primary job held during the week of April 15, 1999. The following are the definitions for each of these categories. Private industry and business includes all private for-profit and private not-for-profit companies, businesses, and organizations, except those reported as educational institutions. It also includes persons reporting that they were self-employed. Educational institutions include elementary and secondary schools, 2-year and 4-year colleges and universities, medical schools, university-affiliated research organizations, and all other educational institutions. Government includes local, state, and Federal Government; military; and commissioned corps.

Primary work activity: Primary work refers to the activity that occupied the most time on the respondent's job. In reporting the data, those who reported applied research, basic research, development, or design work were grouped together in "research and development (R&D)." Those who reported accounting, finance or contracts, employee relations, quality or productivity management, sales and marketing, or managing and supervising were grouped into "management, sales, administration." Those who reported production, operations, maintenance, professional services or other activities were given the code "other."

Full-time salary: Full-time salary is the annual salary for the full-time employed, defined as those who were not self-employed (either incorporated or not incorporated), whose principal job was not less than 35 hours per week, and who were not full-time students on the reference date (April 15, 1999). Graduates who did not receive salaries were asked to report earned income, excluding business expenses. To annualize salary, reported hourly salaries were multiplied by the reported number of hours paid per week, then multiplied by 52; reported weekly salaries were multiplied by 52; reported monthly salaries were multiplied by 12. Yearly and academic yearly salaries were left as reported.

Race/ethnicity: All graduates, both U.S. citizens and non-U.S. citizens, are included in the race/ethnicity data presented in this report. In tables with sufficient sample size, race/ethnicity data are presented by the specific categories of white, non-Hispanic; black, non-Hispanic; Hispanic; Asian or Pacific Islander; and American Indian or Alaskan Native. In tables where the sample size is not sufficient to present data by specific category, the groups of black, Hispanic, and American Indian or Alaskan Native are combined into the underrepresented minority category.

Coverage of Tables

The tables in this report present information for two groups of recent graduates. The first of these groups consists of persons who earned bachelor's degrees in S&E fields from U.S. institutions during academic years 1997 and 1998. The second group includes those who earned S&E master's degrees during the same two years.

EXHIBIT 1. LIST A: EDUCATION CODES

This EDUCATION CODES list is ordered alphabetically. The titles in bold type are broad fields of study. To make sure you have found the BEST code, please review ALL broad categories before making your choice. If you cannot find the code that BEST describes your field of study, use the "OTHER" code under the most appropriate broad field in bold print. If none of the codes fit your field of study, use Code 995.

Agriculture Business and Production
601 Agriculture, economics (also see 655 and 923)
602 OTHER agricultural business and production

Agricultural Sciences
605 Animal sciences
606 Food sciences and technology (also see 638)
607 Plant sciences (also see 633)
608 OTHER agricultural sciences

610 **Architecture/Environmental Design**
(for architectural engineering, see 723)

620 **Area/Ethnic Studies**

Biological/Life Sciences
631 Biochemistry and biophysics
632 Biology, general
633 Botany (also see 607)
634 Cell and molecular biology
635 Ecology
636 Genetics, animal and plant
637 Microbiology
638 Nutritional sciences (also see 606)
639 Pharmacology, human and animal (also see 788)
640 Physiology, human and animal
641 Zoology, general
642 OTHER biological sciences

Business Management/Administrative Services
651 Accounting
652 Actuarial science
653 Business administration and management
654 Business, general
655 Business/managerial economics (also see 601 and 923)
656 Business marketing/marketing management
657 Financial management
658 Marketing research
843 Operations research
659 OTHER business management/admin. services

Communications
661 Communications, general
662 Journalism
663 OTHER communications

Computer and Information Sciences
671 Computer/information sciences, general
672 Computer programming
673 Computer science (also see 727)
674 Computer systems analysis
675 Data processing technology
676 Information services and systems
677 OTHER computer and information sciences

Conservation/Renewable Natural Resources
680 Environmental science studies
681 Forestry sciences
682 OTHER conservation/renewable natural resources

690 **Criminal Justice/Protective Services**
(also see 922)

Education
701 Administration
702 Computer teacher education
703 Counselor education/guidance services
704 Educational psychology
705 Elementary teacher education
706 Mathematics teacher education
707 Physical education/coaching
708 Pre-elementary teacher education
709 Science teacher education
710 Secondary teacher education
711 Special education
712 Social science teacher education
713 OTHER education

Engineering
721 Aerospace, aeronautical, astronautical engineering
722 Agricultural engineering
723 Architectural engineering

EXHIBIT 1. LIST A: EDUCATION CODES (CONTINUED)

Engineering (continued)
724 Bioengineering and biomedical engineering
725 Chemical engineering
726 Civil engineering
727 Computer/systems engineering (also see 673)
728 Electrical, electronics, communications engineering (also see 751)
729 Engineering sciences, mechanics, physics
730 Environmental engineering
731 General engineering
732 Geophysical engineering
733 Industrial engineering (also see 752)
734 Materials engineering, including ceramics and textiles
735 Mechanical engineering (also see 753)
736 Metallurgical engineering
737 Mining and minerals engineering
738 Naval architecture and marine engineering
739 Nuclear engineering
740 Petroleum engineering
741 OTHER engineering

Engineering-Related Technologies
751 Electrical and electronic technologies
752 Industrial production technologies
753 Mechanical engineering-related technologies
754 OTHER engineering-related technologies

Languages, Linguistics, Literature/Letters
760 English Language and Literature/Letters
771 Linguistics
772 OTHER foreign languages and literature

Health Professions and Related Sciences
781 Audiology and speech pathology
782 Health services administration
783 Health/medical assistants
784 Health/medical technologies
785 Medical preparatory programs (e.g., pre-dentistry, pre-medical, pre-veterinary)
786 Medicine (e.g., dentistry, optometry, osteopathic, podiatry, veterinary)
787 Nursing (4 years or longer program)
788 Pharmacy (also see 639)
789 Physical therapy and other rehabilitation/ therapeutic services
790 Public health (including environmental health and epidemiology)
791 OTHER health/medical sciences

800 **Home Economics**

810 **Law/Prelaw/Legal Studies**

820 **Liberal Arts/General Studies**

830 **Library Science**

Mathematics
841 Applied mathematics (also see 843, 652)
842 Mathematics, general
843 Operations research
844 Statistics
845 OTHER mathematics

850 **Parks, Recreation, Leisure, and Fitness Studies**

Philosophy, Religion, and Theology
861 Philosophy of science
862 OTHER philosophy, religion, theology

Physical Sciences
871 Astronomy and astrophysics
872 Atmospheric sciences and meteorology
631 Biochemistry and biophysics
873 Chemistry
874 Earth sciences
680 Environmental science studies
875 Geology
876 Geological sciences, other
877 Oceanography
878 Physics
879 OTHER physical sciences

Psychology
891 Clinical
892 Counseling
704 Educational
893 Experimental
894 General
895 Industrial/Organizational
896 Social
897 OTHER psychology

Public Affairs
901 Public administration
902 Public policy studies
903 OTHER public affairs

910 **Social Work**

EXHIBIT 1. LIST A: EDUCATION CODES (CONTINUED)

Social Sciences and History

921 Anthropology and archeology
922 Criminology (also see 690)
923 Economics (also see 601 and 655)
924 Geography
925 History of science
926 History, other
927 International relations
928 Political science and government
929 Sociology
930 OTHER social sciences

Visual and Performing Arts

941 Dramatic arts
942 Fine arts, all fields
943 Music, all fields
944 OTHER visual and performing arts

991 **Other science/engineering**
995 **Other Fields - Not Listed**

EXHIBIT 2. MAJOR CODE CATEGORIES FOR TABULATIONS

1. **Computer and information sciences**
   Computer science and information sciences 671, 673, 674, 676, 677

2. **Life and related sciences**
   Agricultural and food sciences 605-608
   Biological sciences 631-642, 991, (781-791 Ph.D. degree only)
   Environmental life sciences, including forestry sciences 680, 681

3. **Mathematical sciences**
   Mathematics and related sciences 841-845

4. **Physical and related sciences**
   Chemistry, except biochemistry 873
   Earth sciences, geology, and oceanography 872, 874-877
   Physics and astronomy 871, 878
   Other physical sciences 879

5. **Psychology**
   Psychology 891-897, 704

6. **Social and related sciences**
   Economics 601, 923
   Political science and related sciences 902, 927, 928
   Sociology and anthropology 921, 922, 929
   Other social sciences 771, 861, 924, 925, 930, 620

7. **Engineering**
   Aerospace and related engineering 721
   Chemical engineering 725
   Civil and architectural engineering 726, 723
   Electrical, electronic, computer, and communications engineering 727, 728
   Industrial engineering 733
   Mechanical engineering 735
   Other engineering 722, 724, 729-732, 734, 736-741

8. **Other majors**
   602, 610, 651-659, 661-663, 672, 675, 682, 690, 701-703, 705-713, 751-754, 760, 772, 781-791*, 800, 810, 820, 830, 850, 862, 901, 903, 910, 926, 941-944, 995

*At the BA, MA, or professional level.

SOURCE: National Science Foundation/Division of Science Resources Statistics, National Survey of Recent College Graduates, 1999

EXHIBIT 3. LIST B: JOB CODES

This JOB CODES list is ordered alphabetically. The titles in bold type are broad job categories. To make sure you have found the BEST code, please review ALL broad categories before making your choice. If you cannot find the code that BEST describes your job, use the "OTHER" code under the most appropriate broad category in bold print. If none of the codes fit your job, use Code 500.

010 **Artists, Broadcasters, Editors, Entertainers, Public Relations Specialists, Writers**

Biological/Life Scientists
021 Agricultural and food scientists
022 Biochemists and biophysicists
023 Biological scientists (e.g., botanists, ecologists, zoologists)
024 Forestry, conservation scientists
025 Medical scientists (excluding practitioners)
026 Technologists & technicians in the biological/ life sciences
027 OTHER biological/life scientists

Clerical/Administrative Support
031 Accounting clerks, bookkeepers
032 Secretaries, receptionists, typists
033 OTHER administrative (e.g., record clerks, telephone operators)

040 **Clergy & Other Religious Workers**

Computer Occupations (Also see 173)
*** Computer engineers (See 087, 088 under Engineering)
051 Computer programmers (business, scientific, process control)
052 Computer system analysts
053 Computer scientists, except system analysts
054 Information systems scientists or analysts
055 OTHER computer, information science occupations

*** **Consultants** (select the code that comes closest to your usual area of consulting)

070 **Counselors, Educational & Vocational** (Also see 236)

Engineers, Architects, Surveyors
081 Architects
*** Engineers (Also see 100-103)
082 Aeronautical, aerospace, astronautical
083 Agricultural
084 Bioengineering & biomedical
085 Chemical

*** Engineers (continued)
086 Civil, including architectural & sanitary
087 Computer engineer - hardware
088 Computer engineer - software
089 Electrical, electronic
090 Environmental
091 Industrial
092 Marine engineer or naval architect
093 Materials or metallurgical
094 Mechanical
095 Mining or geological
096 Nuclear
097 Petroleum
098 Sales
099 Other engineers

*** Engineering Technologists and Technicians
100 Electrical, electronic, industrial, mechanical
101 Drafting occupations, including computer drafting
102 Surveying and mapping
103 OTHER engineering technologists and technicians

104 **Surveyors**

110 **Farmers, Foresters & Fishermen**

Health Occupations
111 Diagnosing/Treating Practitioners (e.g., dentists, optometrists, physicians, psychiatrists, podiatrists, surgeons, veterinarians)
112 Registered nurses, pharmacists, dieticians, therapists, physician assistants
113 Health Technologists & Technicians (e.g., dental hygienists, health record technologist/ technicians, licensed practical nurses, medical or laboratory technicians, radiologic technologists/ technicians)

114 OTHER health occupations

120 **Lawyers, Judges**

130 **Librarians, Archivists, Curators**

EXHIBIT 3. LIST B: JOB CODES (CONTINUED)

Managers, Executives, Administrators (Also see 151-153)
141 Top and mid-level managers, executives, administrators (people who manage other managers)
*** All other managers, including the self-employed - *Use the code that comes closest to the field you manage*

Management-Related Occupations (Also see 141)
151 Accountants, auditors, and other financial specialists
152 Personnel, training, and labor relations specialists
153 OTHER management related occupations

Mathematical Scientists
171 Actuaries
172 Mathematicians
173 Operations research analysts, modeling
174 Statisticians
175 Technologists and technicians in the mathematical sciences
176 OTHER mathematical scientists

Physical Scientists
191 Astronomers
192 Atmospheric and space scientists
193 Chemists, except biochemists
194 Geologists, including earth scientists
195 Oceanographers
196 Physicists
197 Technologists and technicians in the physical sciences
198 OTHER physical scientists

***Research Associates/Assistants**
(Select the code that comes closest to your field)

Sales and Marketing
200 Insurance, securities, real estate, & business services
201 Sales Occupations - Commodities Except Retail (e.g., industrial machinery/equipment/supplies, medical and dental equip/supplies)
202 Sales Occupations - Retail (e.g., furnishings, clothing, motor vehicles, cosmetics)
203 OTHER marketing and sales occupations

Service Occupations, Except Health (Also see 111-114)
221 Food Preparation and Service (e.g., cooks, waitresses, bartenders)
222 Protective services (e.g., fire fighters, police, guards)
223 OTHER service occupations, except health

Social Scientists
231 Anthropologists
232 Economists
233 Historians, science and technology
234 Historians, except science and technology
235 Political scientists
236 Psychologists, including clinical (Also see 070)
237 Sociologists
238 OTHER social scientist

240 **Social Workers**

Teachers/Professors
251 Pre-Kindergarten and kindergarten
252 Elementary
253 Secondary - computer, math, or sciences
254 Secondary - social sciences
255 Secondary - other subjects
256 Special education - primary and secondary
257 OTHER precollegiate area

*** Postsecondary
271 Agriculture
272 Art, Drama, and Music
273 Biological Sciences
274 Business Commerce and Marketing
275 Chemistry
276 Computer Science
277 Earth, Environmental, and Marine Science
278 Economics
279 Education
280 Engineering
281 English
282 Foreign Language
283 History
284 Home Economics
285 Law
286 Mathematical Sciences
287 Medical Science

EXHIBIT 3. LIST B: JOB CODES (CONTINUED)

*** Postsecondary (continued)
288 Physical Education
289 Physics
290 Political Science
291 Psychology
292 Social Work
293 Sociology
294 Theology
295 Trade and Industrial
296 OTHER health specialties
297 OTHER natural sciences
298 OTHER social sciences
299 OTHER Postsecondary

Other Professions
401 Construction trades, miners & well drillers
402 Mechanics and repairers
403 Precision/production occupations (e.g., metal workers, woodworkers, butchers, bakers, printing occupations, tailors, shoemakers, photographic process)
404 Operators and related occupations (e.g., machine set-up, machine operators and tenders, fabricators, assemblers)
405 Transportation/material moving occupations

500 **Other Occupations (Not Listed)**

EXHIBIT 4. NSF OCCUPATIONAL CODE CATEGORIES FOR TABULATIONS

1. **Computer and information scientists**
   Computer and information scientists 052-055, 088
   Postsecondary teachers in computer sciences 276

2. **Life and related scientists**
   Agricultural and food scientists 021
   Biological scientists 022, 023, 025, 027
   Environmental life scientists including forestry scientists 024
   Postsecondary teachers in life and related sciences 273, 271, 287, 297

3. **Mathematical scientists**
   Mathematical scientists 172-174, 176
   Postsecondary teachers in mathematical sciences 286

4. **Physical scientists**
   Chemists, except biochemists 193
   Earth scientists, geologists, and oceanographers 192, 194, 195
   Physicists and astronomers 191, 196
   Other physical scientists 198
   Postsecondary teachers in physical and related sciences 289, 277, 275

5. **Psychologists**
   Psychologists 236
   Postsecondary teachers in psychology 291

6. **Social and related scientists**
   Economists 232
   Political scientists 235
   Sociologists and anthropologists 231, 237
   Other social scientists 238, 233
   Postsecondary teachers in social and related sciences 278, 290, 293, 298

7. **Engineers**
   Aerospace and related engineers 082
   Chemical engineers 085
   Civil and architectural engineers 086
   Electrical, electronic, computer, and communications engineers 087, 089
   Industrial engineers 091
   Mechanical engineers 094
   Other engineers 083, 084, 090, 092-093, 095-097, 099, 098
   Postsecondary teachers in engineering 280

EXHIBIT 4. NSF OCCUPATIONAL CODE CATEGORIES FOR TABULATIONS (CONTINUED)

8. All other occupations (occupations other than S&E)

Managers and related occupations 141, 151-153
Health and related occupations, 111-114
Educators other than science and engineering postsecondary 253-254, 251, 252, 255-257, 272, 274, 279 281-285, 288, 292, 294-296, 299
Social services and related occupations 240, 070, 040
Technicians, including computer programmers 026, 175, 197, 100-104, 081, 051
Sales and marketing occupations 200-203
Other occupations 010, 031-033, 120, 130, 110, 500, 171, 234, 221-223, 401-405

SOURCE: National Science Foundation/Division of Science Resources Statistics, National Survey of Recent College Graduates, 1999

APPENDIX
ELIGIBLE AND INELIGIBLE MAJORS: 1999

Categories & Fields	1999 NSF CODE	1990 CIP[1] CODE
1. Computer, information, and mathematical sciences (Eligible)		
11 COMPUTER & INFORMATION SCIENCES		
COMPUTER & INFORMATION SCIENCES, GENERAL	671	11.0101
COMPUTER SCIENCE	673	11.0701
COMPUTER SYSTEMS ANALYSIS	674	11.0501
INFORMATION SCIENCES & SYSTEMS	676	11.0401
COMPUTER & INFORMATION SCIENCES, OTHER	677	11.9999
12 MATHEMATICAL SCIENCES		
APPLIED MATHEMATICS, GENERAL	841	27.0301
APPLIED MATHEMATICS, OTHER	841	27.0399
MATHEMATICS	842	27.0101
OPERATIONS RESEARCH	843	27.0302
MATHEMATICAL STATISTICS	844	27.0501
MATHEMATICS, OTHER	845	27.9999
MATHEMATICS & COMPUTER SCIENCE	845	30.0801
2. Life and related sciences (Eligible)		
21 AGRICULTURAL & FOOD SCIENCES		
ANIMAL SCIENCES	605	02.0201-02.0299
FOOD SCIENCES & TECHNOLOGY	606	02.0301
PLANT SCIENCES	607	02.0401-02.0499
SOIL SCIENCE	608	02.0501
AGRICULTURAL SCIENCES, OTHER	608	02.9999
AGRICULTURAL SCIENCES, GENERAL	608	02.0101-02.0102
22 BIOLOGICAL SCIENCES		
BIOCHEMISTRY & BIOPHYSICS	631	26.0202-26.0203
BIOLOGY, GENERAL	632	26.0101
BOTANY	633	26.0301-26.0399
CELL & MOLECULAR BIOLOGY	634	26.0401-26.0499
ECOLOGY	635	26.0603
GENETICS, PLANT & ANIMAL	636	26.0613
MICROBIOLOGY/BACTERIOLOGY	637	26.0501
NUTRITIONAL SCIENCES	638	26.0609
PHARMACOLOGY, HUMAN & ANIMAL	639	26.0705
PHYSIOLOGY, HUMAN & ANIMAL	640	26.0706
ZOOLOGY, GENERAL	641	26.0701
ENTOMOLOGY	641	26.0702
PATHOLOGY, HUMAN & ANIMAL	641	26.0704

Categories & Fields	1999 NSF CODE	1990 CIP[1] CODE
ZOOLOGY, OTHER	641	26.0799
ANATOMY	642	26.0601
MARINE/AQUATIC BIOLOGY	642	26.0607
NEUROSCIENCE	642	26.0608
PARASITOLOGY	642	26.0610
RADIATION BIOLOGY/RADIOBIOLOGY	642	26.0611
TOXICOLOGY	642	26.0612
BIOMETRICS	642	26.0614
BIOSTATISTICS	642	26.0615
BIOTECHNOLOGY RESEARCH	642	26.0616
EVOLUTIONARY BIOLOGY	642	26.0617
BIOLOGICAL IMMUNOLOGY	642	26.0618
VIROLOGY	642	26.0619
MISC BIOLOGICAL SPECIALTIES, OTHER	642	26.0699
BIOLOGICAL SCIENCES, OTHER	642	26.9999
BIOLOGICAL & PHYSICAL SCIENCES	991	30.0101
SYSTEMS SCIENCE & THEORY	991	30.0601
23 ENVIRONMENTAL & FORESTRY SCIENCES		
ENVIRONMENTAL SCIENCE/STUDIES	680	03.0102
FORESTRY SCIENCES	681	03.0502
3. Physical and related sciences (Eligible)		
31 CHEMISTRY		
CHEMISTRY	873	40.0501-40.0599
32 EARTH SCIENCES, GEOLOGY, OCEANOGRAPHY		
ATMOSPHERIC SCI & METEOROLOGY	872	40.0401
EARTH & PLANETARY SCIENCES	874	40.0703
GEOLOGY	875	40.0601
GEOCHEMISTRY	876	40.0602
GEOPHYSICS & SEISMOLOGY	876	40.0603
PALEONTOLOGY	876	40.0604
GEOLOGICAL SCIENCES, OTHER	876	40.0699
OCEANOGRAPHY	877	40.0702
33 PHYSICS & ASTRONOMY		
ASTRONOMY	871	40.0201
ASTROPHYSICS	871	40.0301
PHYSICS	878	40.0801-40.0899
34 OTHER PHYSICAL SCIENCES		
PHYSICAL SCIENCES, GENERAL	879	40.0101
METALLURGY	879	40.0701
MISC PHYSICAL SCIENCES, OTHER	879	40.0799
PHYSICAL SCIENCES, OTHER	879	40.9999

Categories & Fields	1999 NSF CODE	1990 CIP[1] CODE
4. Social sciences and related sciences (Eligible)		
41 ECONOMICS		
AGRICULTURAL ECONOMICS	601	01.0103
ECONOMICS	923	45.0601-45.0699
42 POLITICAL & RELATED SCIENCES		
PUBLIC POLICY ANALYSIS	902	44.0501
INTERNATIONAL RELATIONS & AFFAIRS	927	45.0901
POLITICAL SCIENCE & GOVERNMENT	928	45.1001-45.1099
43 PSYCHOLOGY		
EDUCATIONAL PSYCHOLOGY	704	13.0802
CLINICAL PSYCHOLOGY	891	42.0201
COUNSELING PSYCHOLOGY	892	42.0601
EXPERIMENTAL PSYCHOLOGY	893	42.0801
PSYCHOLOGY, GENERAL	894	42.0101
INDUSTRIAL/ORGANIZATIONAL PSYCHOLOGY	895	42.0901
SOCIAL PSYCHOLOGY	896	42.1601
PSYCHOLOGY, OTHER	897	42.9999
COGNITIVE PSYCHOLOGY	897	42.0301
COMMUNITY PSYCHOLOGY	897	42.0401
DEVELOPMENTAL & CHILD PSYCHOLOGY	897	42.0701
PHYSIOLOGICAL PSYCHOLOGY	897	42.1101
SCHOOL PSYCHOLOGY	897	42.1701
BIOPSYCHOLOGY	897	30.1001
44 SOCIOLOGY & ANTHROPOLOGY		
ANTHROPOLOGY	921	45.0201
ARCHEOLOGY	921	45.0301
CRIMINOLOGY	922	45.0401
SOCIOLOGY	929	45.1101
45 OTHER SOCIAL SCIENCES		
AREA STUDIES	620	05.0101-05.0199
ETHNIC & CULTURAL STUDIES	620	05.0201-05.0299
AREA,ETHNIC,CULTURAL, OTHER	620	05.9999
LINGUISTICS	771	16.0102
PHILOSOPHY OF SCIENCE	861	45.0804 (PART)
GEOGRAPHY	924	45.0701-45.0702
HISTORY OF SCIENCE	925	45.0804 (PART)
URBAN AFFAIRS/STUDIES	930	45.1201
SOCIAL SCIENCES, OTHER	930	45.9999
SOCIAL SCIENCES, GENERAL	930	45.0101
DEMOGRAPHY/POPULATION STUDIES	930	45.0501
PEACE & CONFLICT STUDIES	930	30.0501
GERONTOLOGY	930	30.1101
SCIENCE, TECHNOLOGY, & SOCIETY	930	30.1501

Categories & Fields	1999 NSF CODE	1990 CIP[1] CODE
5. Engineering (Eligible)		
51 AERONAUTICAL & ASTRONAUTICAL ENGINEERING		
AERONAUTICAL & ASTRONAUTICAL ENGINEERING	721	14.0201
52 CHEMICAL ENGINEERING		
CHEMICAL ENGINEERING	725	14.0701
53 CIVIL & ARCHITECTURAL ENGINEERING		
CIVIL ENGINEERING	726	14.0801-14.0899
ARCHITECTURAL ENGINEERING	723	14.0401
54 ELECTRICAL & COMPUTER ENGINEERING		
COMPUTER ENGINEERING	727	14.0901
SYSTEMS ENGINEERING	727	14.2701
ELECTRICAL, ELECTRONICS, COMMUNICATIONS ENGINEERING	728	14.1001
55 INDUSTRIAL ENGINEERING		
INDUSTRIAL/MANUFACTURE ENGINEERING	733	14.1701
56 MECHANICAL ENGINEERING		
MECHANICAL ENGINEERING	735	14.1901
57 OTHER ENGINEERING		
AGRICULTURAL ENGINEERING	722	14.0301
BIOENGINEERING & BIOMEDICAL ENGINEERING	724	14.0501
ENGINEERING MECHANICS	729	14.1101
ENGINEERING PHYSICS	729	14.1201
ENGINEERING SCIENCE	729	14.1301
ENVIRONMENTAL ENGINEERING	730	14.1401
ENGINEERING, GENERAL	731	14.0101
GEOPHYSICAL ENGINEERING	732	14.1601
MATERIALS ENGINEERING	734	14.1801
CERAMIC SCIENCES & ENGINEERING	734	14.0601
TEXTILE SCIENCES & ENGINEERING	734	14.2801
POLYMER/PLASTICS ENGINEERING	734	14.3201
METALLURGICAL ENGINEERING	736	14.2001
MINING & MINERAL ENGINEERING	737	14.2101
NAVAL ARCHITECTURE & MARINE ENGINEERING	738	14.2201
NUCLEAR ENGINEERING	739	14.2301
PETROLEUM ENGINEERING	740	14.2501
ENGINEERING DESIGN	741	14.2901
ENGINEERING/INDUSTRIAL MANAGEMENT	741	14.3001
MATERIALS SCIENCE	741	14.3101
GEOLOGICAL ENGINEERING	741	14.1501
OCEAN ENGINEERING	741	14.2401
ENGINEERING, OTHER	741	14.9999

Categories & Fields	1999 NSF CODE	1990 CIP[1] CODE
6. Non-Science and Non-Engineering fields (Not Eligible)		
OTHER, AGRI-BUSINESS & MANAGEMENT	602	01.0101-01.0102
OTHER, AGRI-BUSINESS & MANAGEMENT	602	01.0104-01.9999
ARCHITECTURE	610	ALL 04
BUSINESS MANAGEMENT	651-659	ALL 08, ALL 52
COMMUNICATIONS	661-663	ALL 09
COMPUTER PROGRAMMING	672	11.0201
DATA PROCESSING TECHNOLOGY	675	11.0301
OTHER, CONSERVATION	682	03.0101
OTHER, CONSERVATION	682	03.0201-03.0501
OTHER, CONSERVATION	682	03.0506-03.9999
CRIMINAL JUSTICE/PROTECT SERVICES	690	ALL 43
EDUCATION	701-703	ALL 13 EXCEPT 13.0802
EDUCATION	705-713	ALL 13 EXCEPT 13.0802
ENGINEERING-RELATED TECHNOLOGIES	751-754	ALL 15
ENGINEERING-RELATED TECHNOLOGIES	751-754	48.0101-48.0199
ENGLISH LANGUAGE, LITERATURE	760	ALL 23
OTHER, FOREIGN LANGUAGE	772	16.0101
OTHER, FOREIGN LANGUAGE	772	16.0103-16.9999
HEALTH PROFESSIONS	781-791	ALL 51
HOME ECONOMICS	800	ALL 19, ALL 20
LAW/PRELAW/LEGAL STUDIES	810	ALL 22
LIBERAL ARTS	820	ALL 24
LIBRARY SCIENCE	830	ALL 25
PARKS, RECREATION, LEISURE	850	ALL 31
OTHER, PHILOSOPHY, RELIGION	862	ALL 38, ALL 39
PUBLIC ADMINISTRATION	901	44.0401
OTHER, PUBLIC AFFAIRS	903	44.0201,44.9999
SOCIAL WORK	910	44.0701
HISTORY, OTHER	926	45.0801-45.0803
HISTORY, OTHER	926	45.0805-45.0899
VISUAL & PERFORMING ARTS	941-944	ALL 50
OTHER FIELDS	995	ALL 10, ALL 12
OTHER FIELDS	995	29.0101
OTHER FIELDS	995	30.1201
OTHER FIELDS	995	30.1301
OTHER FIELDS	995	30.1401
OTHER FIELDS	995	30.9999
OTHER FIELDS	995	ALL 32 THRU 37
OTHER FIELDS	995	ALL 41, ALL 46, ALL 47
OTHER FIELDS	995	48.0201-48.9999
OTHER FIELDS	995	ALL 49

[1] Classification of Instructional Programs